

ABSTRACT

A method of forming an opening in a stack of insulator layers featuring an underlying etch stop layer comprised of a tri-layer insulator composite, has been developed. The tri-layer insulator composite comprised of a bottom silicon rich, silicon oxide layer and a top silicon nitride layer, is first formed on a conductive region of a semiconductor substrate. After deposition of overlying insulator layers a photoresist shape is used as a etch mask to allow the desired contact or via hole shape to be defined in the overlying insulator layers via a first phase of an anisotropic dry etch procedure, with the first phase of the dry etching procedure terminating at the top surface of the silicon nitride layer. An over etch procedure used to insure complete removal of overlying insulator layer from the surface of the tri-layer insulator composite, is next performed as a second phase of the anisotropic dry etch procedure. The high etch rate ratio of insulator layer to silicon nitride allows the over etch cycle to be successfully accomplished without risk to underlying materials. A third phase of the anisotropic dry etch procedure selectively removes the silicon nitride layer and subsequently selectively removes the silicon rich, silicon oxide layer without damage to the now exposed conductive region, resulting in definition of the desired contact or via hole openings in the stack of insulator layers.